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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/717,387	11/18/2003	Thomas W. Stone	10010931-1	7470

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EXAMINER	
LE, THI Q	

ART UNIT	PAPER NUMBER
2613	

DATE MAILED: 10/16/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/717,387	STONE, THOMAS W.	
	Examiner	Art Unit	
	Thi Q. Le	2613	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 November 2003*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-17* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *1-17* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *11/18/2003*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement (IDS) filed on 11/18/2003 was considered by the examiner.

Claim Objections

2. Claims 6 and 9 are objected to because of the following informalities:

a) On **line 4** of **claim 6**, replace "fourth" with --fifth-- after "and said second grating, said";

b) On **line 4** of **claim 9**, replace "at" with --a-- after "system also includes".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. **Claim 16** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. **Claim 16** recites the limitation "said first series of optical components" in **line 6**. There is insufficient antecedent basis for this limitation in the claim.

Claim Rejections - 35 USC § 102

6. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

7. **Claim 16** is rejected under 35 U.S.C. 102(b) as being anticipated by **Rose et al. (US PGPub 2002/0154855)**.

Consider claim 16, Rose et al. clearly show and disclose, an optical multiplexing/demultiplexing system (abstract; figure 2) comprising: a first grating (read as, grating 214; figure 2); a second grating (read as, grating 216; figure 2); a first beam/port (read as, optical fiber input 202; figure 2); and, a plurality of second beam/ports (read as, array 228; figure 2); all of said first series of optical components optically aligned with one another (note; grating 214 must be aligned with grating 216 for the diffracted light to travel from input 202 to outputs port 228; figure 2); wherein a plurality of wavelength division multiplexed signals which pass through said first beam/port and through said first and second grating (figure 2; paragraph 0066); and, wherein each one of the plurality of wavelength division multiplexed signals will pass through one of said plurality of second beam/ports (abstract; figure 2; paragraphs 0062-0063, 0066, 0068-0069).

Claim Rejections - 35 USC § 103

8. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

9. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. **Claims 1-4 and 7-8** are rejected under 35 U.S.C. 103(a) as being unpatentable over **McGuire (US Patent # 6,941,073)** in view of **Rose et al. (US PGPub 2002/0154855)**.

Consider claim 1, McGuire clearly shows and disclose, an optical add/drop multiplexing system (abstract), comprising: a first optical system, with an WDM input beam (read as, first beam/port) (figure 1(A), numeral 101), a grating, 107, for demultiplexing the WDM signal into a plurality of beams (read as, second beam/port) (figure 1(A)); a second optical system, with a grating, 123, for multiplexing the plurality of optical signals into a WDM beam and outputting the WDM beam (read as, third and fourth beam/port) (figure 1(A)); a pixellated, switchable grating (read as, combination of device 111 and 113; figure 1(A)), said pixellated, switchable grating having a plurality of pixels (read as, plurality of beam steerers; column 7 lines 9-19), each of said pixels having a controllable state (column 7 lines 20-21), said pixellated grating being interposed optically between said first optical system and said second optical system (figure 1(A)); and means operably connected to said pixellated grating for controlling the state of each of said pixels (note; although not shown, a device for controlling the state of the beam steerers and micro mirrors is necessary to perform the functions described by McGuire); wherein a plurality of wavelength division multiplexed signals which pass through said first optical

system and said second optical system can be individually exchangeable between said first optical system and said second optical system based upon the state of said pixels as said signals pass through said pixellated grating (abstract; figure 1(A); column 7 lines 7-40; column 10 lines 34-48).

McGuire fails to disclose wherein, the first optical system includes a first series of optical components comprising a first grating, a second grating and a third grating; and the second optical system includes a second series of optical components comprising a fourth grating, a fifth grating and a sixth grating.

In related art, Rose et al. disclose an optical multiplexing/demultiplexing and add/drop filtering device. Diffraction gratings are use to demultiplex and multiplex WDM signal into individual wavelength channels. Rose et al. disclose optical system in which two, three or more gratings could be use in series for multiplexing/demultiplexing and add/drop the optical signals (paragraphs 0133 and 0134).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Rose et al. with McGuire. Because the advantage of using additional gratings is dispersion of wavelength channels are increase, thus improving channel separations.

Consider **claim 2, and as applied to claim 1 above**, McGuire as modified by Rose et al. further disclose, wherein said first grating, said second grating, said third grating, said fourth grating, said fifth grating and said sixth grating are each a non-switchable grating (Rose et al.; figure 23; paragraph 0134).

Consider **claim 3, and as applied to claim 1 above**, McGuire as modified by Rose et al. further disclose, wherein at least one of said first grating, said second grating, said third grating, said fourth grating, said fifth grating and said sixth grating is a non-switchable grating (Rose et al.; figure 23; paragraph 0134).

Consider **claim 4, and as applied to claim 1 above**, McGuire as modified by Rose et al. further disclose, wherein at least one of said gratings is a volume holographic grating (McGuire; column 8 line 39).

Consider **claim 7, and as applied to claim 1 above**, McGuire as modified by Rose et al. further disclose, wherein said first grating and said third grating are optically positioned substantially symmetrically (read as, gratings 214 and 2315 is symmetrically aligned with gratings 216 in order to permits transmission of diffracted light) with respect to said second grating, and said fourth grating and said sixth grating are optically positioned substantially symmetrically with respect to said fifth grating (note, since the first optical system and second optical system would have the same optics arrangements; therefore, the same grating symmetry is preserved) (Rose et al.; Figure 23; paragraph 0134).

Consider **claim 8**, McGuire clearly shows and discloses a reconfigurable optical add/drop multiplexer (ROADM) (read as, add/drop multiplexing system). The ROADM can be divided into two sub-system; the first includes, gratings 307 and 321 (read as, first optical system) (figure 3(a)); while the second sub-system includes two sets of an array beam steerers plate and an array controllable micro mirrors plate (read as, third pair of gratings forming a second optical system, including a switchable grating) (figure 3(a)). The state of each element in the array of beam steerers and micro-mirrors can be individually control (read as, means for controlling the state of

the switchable grating) (column 7 lines 15-25). McGuire further discloses, wherein wavelength division multiplexed input signals can be exchangeable between said first optical system and said second optical system based upon the state of said switchable grating (abstract; figure 3(a); column 7 lines 7-40; column 14 lines 43-55).

McGuire fails to disclose a first optical system comprises a first pair of gratings optically aligned with one another, and a second pair of gratings optically aligned with one another

In related art, Rose et al. disclose an optical multiplexing/demultiplexing and add/drop filtering device. Diffraction gratings are use to demultiplex and multiplex WDM signal into individual wavelength channels (abstract). Wherein, two dual grating pairs are use and each member of the dual pairs is optimized for high diffraction efficiency for a single polarization (figure 30; paragraph 0141-0144).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings of Rose et al. with McGuire. To ensure high diffraction efficiency when randomly polarize light is use in the system; multiples pairs of gratings optimized for different polarization are used.

11. **Claim 5** is rejected under 35 U.S.C. 103(a) as being unpatentable over **McGuire (US Patent # 6,941,073)** in view of **Rose et al. (US PGPub 2002/0154855)** and further in view of **Sutherland et al. (US Patent # 7,018,563)**.

Consider claim 5, and as applied to claim 4 above, McGuire as modified by Rose et al. disclosed an OADM that uses holographic volume gratings, but failed to disclose the use of a polymer-dispersed liquid crystal grating.

In related art, Sutherland et al. disclosed method for optimizing a holographic polymer dispersed liquid crystal (H-PDLC) for use as an optical add/drop switch, multiplexers, and optical cross connect (abstract; column 2 lines 49-53; column 7 lines 4-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings McGuire as modified by Rose et al. with Sutherland et al. Since using a holographic polymer dispersed liquid crystal (H-PDLC) as an OADM have the advantages of being able to control of the following parameters: 1) haze, 2) switching voltage, 3) electrical power dissipation, 4) switching stability (i.e., voltage creep), 5) switching contrast ratio (i.e., dynamic range), 6) dynamic stability, and 7) the operating temperature range; thus, giving better diffraction efficiency.

12. **Claim 6** is rejected under 35 U.S.C. 103(a) as being unpatentable over **McGuire (US Patent # 6,941,073)** in view of **Rose et al. (US PGPub 2002/0154855)** and further in view of **George et al. (US Patent # 4,834,474)**.

Consider claim 6, and as applied to claim 1 above, McGuire as modified by Rose et al. disclosed the invention as described above; except for, wherein, a selected second set of gratings have twice the spatial frequency of a selected first set.

In related art, George et al. disclose an optical system that utilizes diffractive elements to provide optical signal with desired space-time characteristic. Wherein, in a particular embodiment, three diffraction gratings are use and are set up triangularly, figure 23. Gratings 90 and 94 (read as, first and third gratings or fourth and sixth grating) are referred to as base gratings, where as, grating 92 as vertex grating (read as, one of the second, fifth and pixellated grating). In order to provide high diffraction efficiency, the vertex grating, 92, has twice the

spatial frequency of the two base gratings 90 and 94 (column 12 line 34-40). Also similar grating configuration can be cascade to include multiple triangular grating configurations (figure 24; column 12 lines 65-67).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings McGuire as modified by Rose et al. with George et al. Since using the configuration disclosed by George et al., where the vertex grating has twice the spatial frequency of the base gratings, can provide higher diffraction efficiency.

13. **Claims 9 and 10** are rejected under 35 U.S.C. 103(a) as being unpatentable over **McGuire (US Patent # 6,941,073)** in view of **Rose et al. (US PGPub 2002/0154855)** and further in view of **Doerr (US PGPub 2002/0131683)**.

Consider **claim 9, and as applied to claim 8 above**, McGuire as modified by Rose et al. disclosed the invention as described above; except for, the second optical system includes a third beam/port.

In related art, Doerr disclosed an optical device for routing multi-wavelength optical signals. Figure 6 shows a plurality of optical systems (read as, second optical system), 100-1 to 100-4, interconnection with input ports 610-1 to 610-2 and output ports 610-3 to 610-4 (read as, third beam/port) (figure 6; paragraph 0024).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings McGuire as modified by Rose et al. with Doerr. Often time optical network has multiple optical fibers; thus, an OADM need to have a plurality of input and output ports to accommodate each optical fiber.

Consider **claim 10, and as applied to claim 9 above**, McGuire as modified by Rose et al. and further modified by Doerr, further disclosed a fourth optical system (read as, optical system 100-4; Doerr, figure 6, paragraph 0024). The fourth optical system includes gratings 310-1, 315 and 310-2; figure 3 (read as, fourth pair of gratings). Wherein grating 315 is an array of controllable shutter elements (read as, switchable grating), controlled by micromachine control element (Doerr; paragraph 006) (read as, means for controlling switchable grating).

14. **Claim 11** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Doerr (US PGPub 2002/0131683)** in view of **Takushima et al. (US PGPub 2004/0076386)**.

Consider **claim 11**, Doerr clearly shows and discloses, a first, second, third and fourth optical system (figure 6) (read as, first and second optical system. Wherein, each optical system includes gratings 310-1 (read as, first and fourth gratings), 315 (read as, second and fifth gratings), and 310-2 (read as, third and sixth gratings). Grating 315 is an array of controllable shutter elements (read as, switchable grating), controlled by micromachine control element (Doerr; paragraph 006) (read as, means for controlling switchable grating). Doerr fails to disclose, an optical non-switchable grating is place between the first and second optical system.

In related art, Takushima et al. disclosed an optical add/drop multiplexer (paragraph 0005). In a particular embodiment, Takushima et al. disclose an OADM having first optical system, a second optical system and a grating, 130, being place between the two optical systems (read as, a non-switchable grating, said non-switchable grating being interposed optically between said first optical system and said second optical system) (figure 2, paragraph 0028).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings Doerr with Takushima et al. Since the grating disposed

between the two optical system can further disperse the multiplex wavelength light; thus providing between separations of individual wavelength.

15. **Claims 12-13** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Doerr (US PGPub 2002/0131683)** in view of **Takushima et al. (US PGPub 2004/0076386)** and further in view of **Sutherland et al. (US Patent # 7,018,563)**.

Consider **claim 12, and as applied to claim 11 above**, Doerr as modified by Takushima et al. disclosed an OADM that uses multiplex gratings, but fails to disclose that at least one of the grating is a volume holographic grating.

In related art, Sutherland et al. disclosed method for optimizing a holographic polymer dispersed liquid crystal (H-PDLC) (read as, volume holographic grating) for use as an optical add/drop switch, multiplexers, and optical cross connect (abstract; column 2 lines 49-53; column 7 lines 4-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings Doerr as modified by Takushima et al. with Sutherland et al. Since using a holographic polymer dispersed liquid crystal (H-PDLC) as an OADM have the advantages of being able to control of the following parameters: 1) haze, 2) switching voltage, 3) electrical power dissipation, 4) switching stability (i.e., voltage creep), 5) switching contrast ratio (i.e., dynamic range), 6) dynamic stability, and 7) the operating temperature range; thus, giving better diffraction efficiency.

Consider **claim 13, and as applied to claim 12 above**, Doerr as modified by Takushima et al. and further modified by Sutherland et al. further disclosed an OADM that uses polymer

dispersed liquid crystal (read as, Polymer Dispersed Liquid Crystal (PDLC) grating) (Sutherland et al.; abstract; column 2 lines 49-53; column 7 lines 4-26)

16. **Claims 14-15** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Doerr (US PGPub 2002/0131683)** in view of **Takushima et al. (US PGPub 2004/0076386)** and further in view of **McGuire (US Patent # 6,941,073)**.

Consider **claim 14, and as applied to claim 11 above**, Doerr as modified by Takushima et al. disclosed a signal switchable grating being place between two non-switchable gratings (Doerr; figure 3); but fails to disclose of another switchable grating being place between the non-switchable gratings.

In related art, McGuire disclose an ROADM; wherein a first pair of beam steerers array, 311, and programmable mirrors array, 313, and a second pair of beam steerers array, 319 (read as, first switchable grating), and programmable mirrors array, 317 (read as, second switchable grating), is place between two diffraction gratings 323 and 307 (read as, non-switchable grating) (figure 3(a); column 14 lines 42-54).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings Doerr as modified by Takushima et al. with McGuire. Since having two switchable grating enhance the process of adding/dropping individual wavelength into the optical signal.

Consider **claim 15, and as applied to claim 14 above**, Doerr as modified by Takushima et al. and further modified by McGuire further disclose, an optical system, 100-3 (read as, third optical system) having gratings 310-1, 315 and 310-2 (Doerr; figure 3 and 6). Wherein, grating

315 is an array of controllable shutter elements (read as, switchable grating), controlled by micromachine control element (Doerr; paragraph 006).

17. **Claim 17** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Rose et al. (US PGPub 2002/0154855)** in view of **Sutherland et al. (US Patent # 7,018,563)**.

Consider **claim 17, and as applied to claim 16 above**, Rose et al. disclosed the invention as described above; except for, at least one of the gratings used is a volume holographic grating.

In related art, Sutherland et al. disclosed method for optimizing a holographic polymer dispersed liquid crystal (H-PDLC) (read as, volume holographic grating) for use as an optical add/drop switch, multiplexers, and optical cross connect (abstract; column 2 lines 49-53; column 7 lines 4-26).

It would have been obvious for a person of ordinary skill in the art at the time of the invention to incorporate the teachings Rose et al. with Sutherland et al. Since using a holographic polymer dispersed liquid crystal (H-PDLC) as an OADM have the advantages of being able to control of the following parameters: 1) haze, 2) switching voltage, 3) electrical power dissipation, 4) switching stability (i.e., voltage creep), 5) switching contrast ratio (i.e., dynamic range), 6) dynamic stability, and 7) the operating temperature range; thus, giving better diffraction efficiency.

Conclusion

18. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a) BRIENZA MICHAEL J. et. al.; 3,549,239

b) Stone et al.; 4,786,124

c) Simon, Ulrich; 6,178,041

d) Tedesco et al.; 2002/0044725

e) Senturia, Stephen D.; 2002/0167695

f) Derventzis et al.; 6,665,460

g) Soskind, Yakov G.; 6,735,362

h) Kewitsch et al.; 6,801,310

i) Cohen et al.; 2005/0036202

j) Lalonde et al.; 7,106,966

k) Barton et al.; 6,909,822

l) Neilson, David T.; 6,996,343

19. Any response to this Office Action should be **faxed to** (571) 273-8300 **or mailed to**:

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Hand-delivered responses should be brought to

Customer Service Window
Randolph Building
401 Dulany Street
Alexandria, VA 22314

20. Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Thi Le whose telephone number is (571) 270-1104. The Examiner can normally be reached on Monday-Friday from 7:30am to 5:00pm.

If attempts to reach the Examiner by telephone are unsuccessful, the Examiner's supervisor, Kenneth Vanderpuye can be reached on (571) 272-3078. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free) or 703-305-3028.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist/customer service whose telephone number is (571) 272-2600.

Thi Le

KENNETH VANDERPUYE
SUPERVISORY PATENT EXAMINER